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INTEGRATING THE AMERICANS WITH DISABILITIES ACT AND THE RECREATION OPPORTUNITY SPECTRUM INTO AN EFFECTIVE TRAIL DIFFICULTY RATING SYSTEM

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ABSTRACT

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TITLE: Integrating the Americans with Disabilities Act and the Recreation Opportunity Spectrum into an Effective Trail Difficulty Rating System.

ABSTRACT: The passage of the Americans with Disabilities Act of 1990 provides new direction and the opportunity to revise the existing trail difficulty rating system to incorporate the requirements of that Act and the concepts of the Recreation Opportunity Spectrum (ROS). The current rating system is not adapted to management according to the concepts of ROS and is not readily adaptable to an expanded range of trails made necessary by the Act.

The requirements of the Act as they apply to trails are reviewed. Traditional applications and standards of the Recreation Opportunity Spectrum are modified and adapted to suit accessibility guidelines and a broader range of experiences. A three-part trail difficulty rating system is recommended which considers the needs of the individual trail user, the accessibility objectives for different ROS classes, and the difficulty of a trail as determined by criteria specific to that user.

Keywords: Recreation, Trails, Difficulty, Accessibility, Barrier-free, Recreation Opportunity Spectrum, Americans with Disabilities Act, Rating System.

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EXECUTIVE SUMMARY

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SUMMARY:

In this paper, the author documents the analysis and recommendations for a revised trail difficulty rating system and develops recommendations for trail difficulty and accessibility that conform to direction provided by the Americans with Disabilities Act of 1990 (the Act) and the Recreation Opportunity Spectrum (ROS). Prior to this project, the requirements of the Act had not been formally integrated with ROS as they apply to trail management. The existing trail difficulty rating system described in the Forest Service Trails Management Handbook does not directly respond to the requirements of the Act or to the concepts of ROS.

Recommendations are based on application of existing direction provided by the Act, Forest Service Handbooks and publications, information from the literature, and recommendations from Forest Service staff and representatives of trail user groups.

Rating trail difficulty is complicated by the existence of a variety of trail user types, many trail condition parameters, and inconsistent utilization of trail condition factors by the various users. With the passage of the Act, the accessibility objectives for the trail and area in which it occurs become additional factors of interest to the trail user and the trail manager.

The author recommends a three-part trail difficulty rating system composed of a graphic symbol for the user, a numerical accessibility level from 1 through 4 associated with the ROS class in which the trail occurs, and an alphabetic difficulty level from A through C. The alphabetic difficulty ratings correspond to the existing standards for Easiest, More Difficult, and Most Difficult. A typical rating might be Hiker-3B. This rating identifies to whom the rating applies (hikers), what the accessibility objectives for the trail are (Level 3 objectives for the Semi-primitive ROS class), and how difficult the trail is according to a set of user-specific criteria (More Difficult).

The distribution of these various difficulty levels among ROS classes is also considered. Requirements of the Act apply most directly to facilities such as buildings, displays, restrooms, etc. and to what degree access is provided to and within those facilities. ROS deals with experiences and how facilities or other evidences of management contribute to the desired experience. A key concept is whether the trail provides access to experiences or is itself the experience. Trails and walkways in Urban/Rural environments tend to be more biased toward providing access to developed facilities. Conversely, trails in the Primitive ROS classes are generally a major part of the experience, providing a pathway from which the user experiences many sensations. In many cases, there are no developed facilities served by the trail. Similarly, trails for use with mechanized equipment, such as mountain bikes or motorcycles, primarily provide an experience as opposed to access to facilities.

For those trails that do not provide access to facilities, a broader range of difficulty is recommended. For example, the most difficult level of motorcycle trail is appropriate in an Urban/Rural environment, if it can be provided, because its difficulty does not prohibit access to a facility and it provides an experience to which some may not otherwise have access.

On the other end of the spectrum, the easiest level of trail may occur occasionally in a Primitive area where it is possible to provide this level of accessibility without compromising the primitive experience. While it is not the norm, it is not prohibited. The recommendations recognize that some difficulty levels are inappropriate in some ROS classes because the standards for difficulty conflict with the standards for experiences in the class. An example of this is that the easiest barrier-free trails should not occur in the Primitive ROS class (Accessibility Level 4) due to the requirements for hard trail surfacing. The recommendations continue to recognize the prohibition of motorized uses in the Primitive ROS class, whether in Wilderness or non-Wilderness.

As applied here, ROS provides a framework for defining accessibility objectives. The Act provides the impetus to make available the broadest possible range of experiences in each ROS class, consistent with maintaining the basic character of the class.

The analysis and recommendations are based on Forest Service-wide direction and interpretation by staff from the Washington Office and the Pacific Northwest Region. Therefore, recommendations are expected to be suitable for discretionary application Service-wide and may be adapted to other agency needs as appropriate.

INTRODUCTION

The passage of the Americans with Disabilities Act of 1990 (hereafter referred to as "the Act") was an historic event. The Act provides for equal access for the disabled to facilities, sites, education, interpretation, and experiences. It goes beyond previous policies and legislation by providing a clear and comprehensive mandate and enforceable standards. Further, it establishes the authority of the Federal Government to enforce the requirements (101st Congress, 1990). This legislation initiated action on many fronts, including modification of Government facilities to a barrier-free condition, the creation of new and innovative information and interpretive programs, and revised standards and expectations for trails.

The Act has applied standards for accessibility across the spectrum of recreation opportunities. Trails, whether providing access to facilities or in their role as the primary developed feature, are a part of that spectrum. This new emphasis requires Forest Service trail managers to expand their range of thinking from the semi-primitive and primitive trails typical of many Forests to a broader spectrum of trail difficulty and accessibility. Because of these changes, we need a new system for defining, planning, and communicating trail accessibility and difficulty. Existing standards and methods of rating trail difficulty are no longer adequate. We now have the need and opportunity to incorporate the concepts and objectives of the Recreation Opportunity Spectrum (ROS) into a new trail difficulty rating system (USDA Forest Service/b, 1990).

Purpose

The objective of this project was to create something that does not now exist---a simple, single-number trail difficulty rating system which serves several purposes, including:

1. Describing trail condition on a relative scale such that the trail manager and trail user could get an accurate mental picture of what a Level 4 trail might look like, for example, as compared to a Level 2 trail or a Level 7 trail. As a tool for trail planning and management, this would provide a means of defining objectives, inventorying and storing data on existing trails, and manipulating data to evaluate needed changes or opportunities in trail management.

2. Rating trail difficulty for potential users. Each user has a need to know if a trail is suitable for their skills and ability, provides the experiences they are seeking, and can be enjoyed within their limits of time and resources.

3. Comparing and coordinating trail conditions with the accessibility objectives for lands on which they occur.

4. Monitoring accessibility and compliance with the Act.

Examples of simple rating systems include the European Rapid Rating System (Urban, 1981) and the Sierra Club system and other similar rock climbing rating systems (Beckey, 1979), all of which use numerical scales in which the degree of difficulty increases with ascending numerical ratings. As will be shown, a rating system which meets the above needs is necessarily more complex than the simple rating systems mentioned.

In this paper, the author reviews the current direction for accessibility and defining difficulty. Based on that review and analysis, a new difficulty rating system and revised standards for trail difficulty within specific ROS classes is recommended, incorporating the following key elements:

1) accessibility direction contained in the Act;

2) characteristics of existing rating systems for difficulty or hazard used in some other common recreation activities; and,

3) the concepts of the Recreation Opportunity Spectrum as they apply to trail management.

Limitations

There are a number of important subjects and issues that overlap and interact with the subject of trail difficulty rating. While they may be referred to or considered in the discussions and evaluation, they are not specifically analyzed in this paper. Some related issues or subjects which are not analyzed in detail include:

1) The trail environment as a factor in user choice or satisfaction.

2) Final development of individual user difficulty rating criteria, i.e., what standard of trail slope, width, tread, etc. a particular user group attributes to a given difficulty rating. The standards used or referred to in this paper will be identical to or adapted from existing standards. Many of these standards need review by the users and modification to coincide with the abilities and needs of trail user groups.

3) Detailed logistics of implementation, such as sign standards, transition period, compliance standards, etc.

4) Winter trail characteristics for Nordic skiing, snowshoeing, or snowmobiling.

5) Issues related to user conflicts on trails designated for use by more than one user group (multiple-use trails).

6) Issues and requirements for accessibility related to types of "facilities" other than trails.

7) Alternatives for signing which display the revised difficulty rating system. The author had hoped to recommend a specific sign standard which resolves some of the existing problems with trail signing and the communication of different levels of difficulty to different user groups. However, brief investigation revealed a number of existing standards, from visibility requirements to Wilderness aesthetics to the dimensions of existing trail information signs, which makes this a very complex subject. This is particularly true when applying the concepts of this paper to other agencies. The issue will be briefly addressed in Discussion and Summary, but no resolution will be offered.

8) Potential changes in management policies or standards which might allow improved access. A specific example is the potential for changing Wilderness direction to allow or encourage the construction of barrier-free trails or other facilities.

9) Expansion of the existing three-level difficulty rating system into four or more categories. A broader range of trails served by a single difficulty rating system, such as is recommended here, creates at least the opportunity for a larger number of rating categories. Analysis of this opportunity would have to consider the existing range and how well or poorly it serves the needs of trail users. If the recommended system is adopted, the suitability of a three-level system should be monitored. Changes should be responsive to specific objectives.

10) Variations in trail difficulty associated with seasonal weather conditions. All discussion of trail condition parameters and relative difficulty assume the trail is in good condition as defined during the managed use season.

Terminology

Because of the complexity and sensitivity of some of the issues, there are often several terms used to describe the same concept. Following are some terms that are important in understanding this subject. The definitions are those that have been adopted for the purposes of this project.

Accessible or accessibility:
A condition whereby "a site, building, facility or portion thereof--- complies with these standards **and**---can be approached, entered and used by physically disabled people" (Frayer and Meade, 1992). In this case, "these standards" are the standards set by and associated with the Act.

Accessibility level:
A level of challenge associated with the four condensed ROS classes, normally defined in narrative form (Frayer and Meade, 1992). This can be an objective determination once criteria or standards for accessibility are established.

Barrier-free:
Synonymous with accessible.

Challenge:
The degree to which a trail requires more or less use of one's physical ability, stamina, skill, etc.

Difficulty level or difficulty rating:
A ranking or classification of the subjective degree of challenge provided by a given trail condition to a specific trail user. This depends on the user's means of travel (motorized, mechanized, stock, by foot, or with the aid of devices to overcome disabilities) and ability (experience, skill, physical condition, etc.). It may also depend on the person's exposure to various trail conditions.

Disability:
A loss or reduction of functional ability which results from an impairment.

Handicap:
A disadvantage caused by the disability.

Impairment:
An anatomic or functional abnormality or loss which may or may not result in a disability. (Frayer and Meade, 1992).

Impairments, disabilities, and handicaps (how they relate to each other):
Impairments are medical conditions, disabilities are the resulting functional consequences, and handicaps are social consequences. "The handicap is therefore an artificial or created barrier that can be avoided with appropriate forethought at the design stage. People are only handicapped insofar as society fails to cater for them" (Frayer and Meade,1992).

Recreation Opportunity Spectrum (ROS):
A framework for understanding the relationship and interactions of setting indicators, such as access, remoteness, naturalness, facilities, visitor impacts, etc. (USDA Forest Service, 1990). In simpler terms, it is a way of describing the range of experiences that a person might have, or that recreation managers might try to provide, through their use of areas which are highly developed, moderately developed, or totally undeveloped.

The terms "disabled" or "person(s) with disabilities" will be used to refer to someone who suffers any physical impairment that results in a reduction of their ability to

move freely from place to place.

As can be seen in the above definitions, accessibility, difficulty and challenge are closely related. They are sometimes used interchangeably in the literature. However, the subjective nature of "difficulty" makes it different from other terms which might describe a trail.

METHODOLOGY

The author used a number of sources for gathering information related to the subject, including a review of recreation literature, conversations with Forest Service personnel, a meeting with representatives of the trail user groups, and reference to Forest Service direction. This information was then analyzed to determine the nature of the problems with existing systems and identify possible alternatives.

Literature review and information sources

In contrast to many recreation issues, there is little literature available on trail difficulty and rating systems. In researching this subject, approximately twenty-five papers or articles were reviewed on the subject of trails, trail conditions, and user characteristics. Much of the available literature focuses on urban settings, providing information for the more developed segments of the Recreation Opportunity Spectrum. Also, hiker diversity and the demand for different experiences has been studied. Most of the major references for this paper come from USDA Forest Service sources.

In addition to literature references, information from many people was used. Jack Stiverson and Chuck Frayer of the Pacific Northwest Regional Office, USDA Forest Service, were very helpful in setting a framework for the objectives of this paper and providing reference materials. Joe Meade of the Washington Office, USDA Forest Service, also helped with reference sources and authored or co-authored key references. Members of the recreation and trails staffs of the Gifford Pinchot National Forest and Packwood Ranger District were also consulted.

The staff of the Gifford Pinchot National Forest works with a number of public interest groups, including the Gifford Pinchot Trails Task Force. This group of ten people was formed in the mid-1980's during the development of the Gifford Pinchot National Forest Land and Resource Management Plan and includes representatives from most of the trail user groups. Unfortunately, this group does not include a representative of trail users with disabilities. Despite that shortcoming, the group was an excellent source of information and recommendations regarding trail conditions and difficulty rating systems.

The existing trail difficulty rating system is described in Forest Service Handbook 2309.18-91-2, Trails Management Handbook, hereafter referred to as "the Handbook" (USDA Forest Service, 1991). While it includes an approved three-level,

user-specific system for rating difficulty for each user, the ratings (Easiest, More Difficult, Most Difficult) do not provide reference to the relative condition or accessibility of the trail in terms that fit with the ROS concept. An "Easiest" trail for hikers, for example, far exceeds the standards for a "Most Difficult" barrier-free trail. Therefore, the system is not useful for establishing trail management objectives or for determining to what ROS class or classes a trail might be appropriate.

Members of the Gifford Pinchot Trails Task Force said that the existing standards for difficulty defined for each user type are, in general, fairly accurate and useful. However, some standards should be revised to better fit with the user's perceptions of difficulty. That fine tuning is outside the scope of this project. However, the need and opportunity will remain if the recommended rating system is adopted.

Two key references are the "Draft Design Guide for Accessible Outdoor Recreation" (Frayer and Meade, 1992) and a training paper titled "Semi-Primitive, Primitive, and Wilderness Settings and the Americans With Disabilities Act" (Meade, 1992). These documents provide interpretation and application of the requirements of the Act to trails, Wilderness, and other more primitive areas.

"Accessibility standards such as UFAS and ADAAG (Uniform Federal Accessibility Standards and Americans With Disabilities Act Accessibility Guidelines) were developed primarily for building and ancillary components; they were never intended to provide technical provisions for many aspects of outdoor recreation". "Consistent with the Wilderness Act no agency is required to provide any form of special treatment or accommodation" within Wilderness areas outside of current existing laws pertaining to disability access to Federal facilities, programs, and activities (Meade, 1992). This affirms the need and appropriateness of a full range of experiences and difficulty in our trail system, some of which will not be accessible to all users.

However, the Act does not relieve Federal managers from Section 504 and Titles II and III of the Act which prohibit Federal agencies from discriminating against people with disabilities by preventing access to a program or activity. In this context, the Wildernesses experience, or in some cases the trail experience, are the programs or activities. The challenge, then, is to develop standards and methods that provide the highest level of access without diminishing the experience itself (Meade, 1992). In this paper, the author will explore the role of trails, in the context of a program or experience, that cannot be made totally accessible without substantially diminishing the experience.

Frayer and Meade discuss the six major classes of experiences as defined in ROS: Urban (U), Rural (R), Roaded Natural (RN), Semi-Primitive Motorized (SPM), Semi-Primitive Non-Motorized (SPNM), and Primitive (P) (Frayer and Meade, 1992). In addition to the basic classes, there is a subdivision of Roaded Natural, called Roaded Modified, and an outgrowth or expansion of the Primitive class called the Wilderness Recreation Opportunity Spectrum (WROS). Roaded Modified is a class used in the Pacific Northwest Region for areas where substantial timber has been

removed, creating conditions not adequately described by any major category. The Wilderness Recreation Opportunity Spectrum is roughly equivalent to the Primitive class but includes standards and guidelines which are characteristic of designated Wilderness areas (USDA Forest Service/a, 1990).

The six major ROS classes are condensed into four groups corresponding to accessibility levels. These are Urban/Rural, Roaded Natural, Semi-Primitive Motorized and Non-Motorized, and Primitive. Accessibility Levels 4 through 1, respectively, are assigned to these classes. Expected Experience, Modifications, and Accessibility associated with each class are defined (Frayer and Meade, 1992). These will be referred to later in Analysis, including a recommendation and rationale that the numbering of the Accessibility Levels be reversed.

Beneficial Designs, Incorporated, describes a method of evaluating trail conditions with an emphasis on access for the disabled. Their work focused on developing innovative methods to measure four trail condition parameters related to slope, tread width and trail "quality", and ways to graphically display those trail conditions to users. This study is aimed at identifying trails that are or can be made barrier-free. For example, their inclination classes are "5% or less, 6-9%, 10-13%, and greater than 13%". "Surface" descriptions are divided into five categories, "hard paved surface, hard packed surface, medium/average surface, soft/fine surface, and very irregular and soft surface". The majority of typical National Forest trail mileage exceeds or falls in the upper ranges of their classification standards. They have not recommended a comprehensive system for displaying those trail conditions and other trail characteristics which may be critical for some uses in a manner useful to all trail users. Additional studies will be conducted during 1993 (Axelson and Chelini, 1992).

Recommendations from the Gifford Pinchot Trails Task Force that a wide range of experiences be available to all users in all appropriate settings are substantiated in a study of hiker diversity in backcountry areas. "One danger of defining diversity on such a broad scale is the tendency to overlook user differences within activities or land classifications. A common perception is that people using similar areas for the same activity want the same type of recreation experiences. However, this is not necessarily the case." (Virden and Schreyer, 1988).

"Significant differences in all three sets of variables among study areas suggest that recreationists choosing the same Recreation Opportunity Spectrum (ROS) land class are seeking a variety of experiences" (Virden and Schreyer, 1988). This suggests that the recreationist may accept or demand a wider range of experiences in each ROS class than Forest Service standards currently provide.

One land allocation which allows for very little flexibility in experiences is the designated Wilderness allocation within the ROS Primitive and WROS classes. By law and policy direction, trail user types and experiences are limited to non-mechanized, non-motorized uses and very limited development of facilities or amenities.

The legal and appropriate use of mechanical assistance, such as a wheel-chair, by disabled persons has only recently been acknowledged by some Wilderness managers. According to the Act, "nothing in the Wilderness Act is to be construed as prohibiting the use of a wheelchair in a wilderness area by an individual whose disability requires use of a wheelchair" (Meade, 1992).

ANALYSIS

Barriers to a simple solution

The greatest barrier to a simple rating system lies in the objectives for use of the ratings. It must be at once objectively descriptive for planning and administration, and subjectively descriptive in a simplified form for the user. It must also contain or represent the myriad of different trail condition parameters that are important to the many different user groups.

The difficulty of creating a single-number system which assigns a number, or letter, to trail conditions that are measurably different becomes apparent when one considers the broad range of trail conditions, what physical characteristics must be measured, and what those measurements mean to the user and the trail manager (Table 1). Unlike rock climbing or whitewater rafting, trail users exhibit many more differences in type of use, ability and desired experiences. Therefore, the range of difficulty and desired experiences for a trail system is much broader and more complex than for these relatively specialized forms of recreation.

After introducing the subjective concept of "difficulty", the number of physical characteristics grows dramatically. While one user may be concerned only with tread condition and slope, another may be concerned about the specifications for brushing and the type of switchbacks.

The Handbook identifies a total of 23 separate trail parameters for nine user types, including snowmobiles, Nordic skiers and 4x4's. These are shown in Table 1.

Table 1. Trail Condition parameters. FSH 2309.18-91-2

Grade---	Maximum Pitch	
	Maximum sustained pitch	
	Length	
	Turning radius	
Clearing---	Width	
	Height	
	and, Wooded, Open, Uphill,Downhill, Sidehill, or Level	
Tread---	Width	
	Surface	
	Groomed	
Elevation differential		Number of rest stops
Obstacles		Trail edge
Exposure (sidehill)		Average speed
Traffic flow		Turns per 1/4 mile

The range of user types is incomplete, missing such relatively new activities as the use of llamas, dogs and goats as pack stock. To further complicate matters, the parameters that are shared by more than one user have different standards for what constitutes a particular level of difficulty, as shown in Table 2.

Table 2. Selected difficulty standards for EASIEST trails. FSH 2309.18-91-2.

USER TYPE	MAX. GRADE	TREAD WIDTH	SURFACE
Hiker	20%	18" - 24"	Spot gravel
Pack & Saddle	15%	24"	As needed for stability
Mountain Bike	10%	24"	relatively smooth
Barrier-Free	3%	4' - 8'	concrete or asphalt

Other parameters

The generally accepted major factors of trail difficulty are included in the Handbook rating in one or more forms, depending on the users and what aspects of the basic factors are important to their use. These basic factors include grade or slope, tread

width, tread condition or surface, and clearing (USDA Forest Service, 1991; Axelson and Chelini, 1992).

Some trail managers suggest that length should be a primary factor in the difficulty rating of a trail, while others recommend that it be considered separately. With a few exceptions, the existing three-level rating system considers length only in the context of how long a particularly steep segment may be, thus contributing to the difficulty of that segment and indirectly to the difficulty of the trail. The length of the trail from Trailhead to destination is not a factor. The exceptions, for ATV's and 4 X 4's, show mileage more as trail lengths which should be associated with a particular difficulty level than as a true factor in the difficulty rating (USDA Forest Service, 1991).

Trail length is a basic and separate piece of information provided in many forms for virtually all trails. Depending on local Forest policies, it may be found on recreation and Wilderness maps, in trail guides, on signs at trailheads and trail junctions, and in other sources. The length is always given as a distance from trailhead or beginning to some destination or terminus. When provided separately, it allows the user to consider that information with other information about trail condition to make decisions.

If length were to be included in the difficulty rating, along with physical parameters such as slope, tread width, etc., the manager should answer some key questions. How far will the user go? Will they go all the way to the ultimate destination or terminus? Or, will they only go to the lake mid-way on the trail? We cannot answer these questions for every user. Therefore, it is the destination, not the total length of a trail, that has the greatest distance-related effect on the difficulty of a trail. Each user will personally determine how much of a trail they will utilize. They will factor that into the information they have on the physical characteristics of the trail (provided by the difficulty rating) to determine if it meets their needs.

For these reasons, the author recommends that trail length not be considered a parameter in a trail difficulty rating system.

Another factor that has been suggested by some trail managers as a parameter for difficulty rating, or a piece of information that should be provided for all trails, is the time required to hike or otherwise use the trail. Time is an increasingly precious commodity for most of us. Whether embarking on an afternoon stroll in a park, a weekend trek in the Wilderness, or an adventure of several weeks, the user must make some judgement of how long their journey will take.

As with length, the destination is an important factor in determining the time necessary to hike a trail. However, the key factors are the ability, skill level, and desired experience of the user. In current practice, we most often see the time required to hike a trail provided in urban settings such as parks, zoos, and other highly developed sites. Trails tend to be highly developed and provide a very narrow range of experiences. That experience may be a quiet stroll or a family walk,

including periodic stops to view scenery, read interpretive materials, view animals, etc. Or, it may be a walking or jogging trail. In these cases, the time required is more easily estimated because the user type, expected experiences, and user behaviors are either carefully controlled or can be reasonably estimated based on observation.

Two additional factors which allow time to be fairly accurately estimated for these urban trails are that they tend to be relatively short, by National Forest trail system standards, and many are loop trails. Where there are numerous alternative routes, such as in zoos which use trails to access many exhibits, walking times are not usually found.

More challenging trails, those typically found in the less developed ROS classes, tend to be longer and have a greater variety of user types, the user experiences are less controlled and more dependent on the person, and trail conditions are more varied. The physical ability, destination objectives, and experience objectives of the user then become so variable that any "average" time to use the trail becomes meaningless. A fit, competitive hiker seeking a good workout, or simply in a hurry, may cover one mile of steep, difficult trail in 20 minutes. The same person may choose to enjoy a much easier trail in a leisurely one-hour stroll.

The "average human being" is a myth (Frayer and Meade, 1992). Therefore, it follows that any effort to determine an average time to use a trail, except under the most controlled or limited conditions, is doomed to failure.

Given these multiple demands and expectations, and many parameters to be considered for each of a variety of users, what would this rating system look like?

If a single-number system was devised, it could be graphically represented by a line.

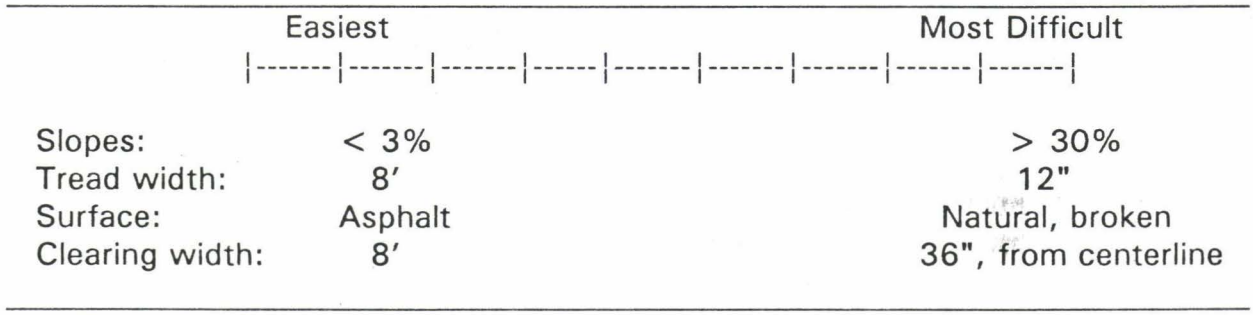


Figure 1. Conceptual diagram of a single-number difficulty rating system.

On the left end of Figure 1, the system begins with the most accessible, least difficult, least challenging trail commonly encountered---what is now classed as the "Easiest" barrier-free trail. For clearing width, the maximum width is found for Pack and Saddle trails. The major parameters are:

Width:	One-way---4' Two-way---8', or 4' with turnouts
Surface:	Concrete or asphalt with rock subgrade.
Clearing:	At least 1' from edge of trail; 8' for Pack and Saddle.
Slope:	$\pm$1% to 3%
Length:	Up to 1/2 mile (barrier-free standard only)

On the right end of Figure 1, the system ends with the least accessible, most difficult and most challenging trail, what is now classed as the "Most Difficult" hiker trail. The major parameters are:

Width:	12"
Surface:	Typically no graded tread
Clearing:	36" from centerline
Slope:	30%+ for up to 500' (Note that this is a design standard. Some existing trails exceed the 500-foot segment length.)

Interestingly, and not entirely coincidentally, this minimal "trail" is about the last vestige of development or convenience before one makes the transition into cross-country scrambling and climbing. The National Climbing Classification System provides that "Class 1 may range from hiking cross-country, to a rock gradient; generally the hands will not be needed more than very occasionally". This system ranges from Class 1 through Class 5, with climbing protection being required in Class 5. Because relative difficulty in this most critical end of the climbing spectrum is very important to the climber, Class 5 is further broken down into a decimal system, from 5.0 to 5.10 (Beckey, 1979).

Although this single-number system works well for climbing, it does so because it is a very narrow range of experience and it serves a very narrow range of users as compared to the wide range of trails and users.

Figure 1 displays only four parameters of use from the least difficult to the most difficult trails. If you add the other parameters of concern to the broad range of trail users, and the fact that those conditions occur on the trail in a near-endless variety of combinations, the number of necessary divisions on the continuum becomes

unworkable. Members of the Gifford Pinchot Trails Task Force were in agreement: the average user can effectively utilize no more than about four different categories of difficulty.

A more complex solution

If a single-number rating system is ineffective because it cannot represent the interrelationships of multiple trail condition parameters, an alternative is to incorporate more than one factor in the rating nomenclature. As has been displayed, there are three factors which lead to a complex solution: adaptability to the diverse demands of the full range of trail users, incorporation of ROS concepts and classes, and consideration for the many parameters of trail condition that are important, in varying combinations, to the users. It follows, then, that one solution is to represent each of those factors separately in the rating nomenclature.

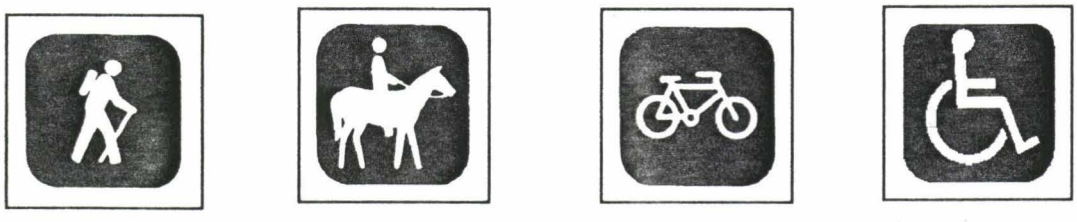
A three-part rating system

Part 1: User identification

The number of parameters for measuring trail condition (Table 1) and the wide variety of standards within those parameters suggest that a separate difficulty rating for each type of use is needed. For a difficulty rating to be useful to a particular user, the appropriate parameters must be considered, and the standards for difficulty applied to each parameter must be specific to that user. Therefore, the user designation is the first element in the difficulty rating. Each trail should have a rating for each user type for which the trail is managed. The currently acknowledged user types in the Handbook are:

Hiker	Pack and Saddle	Mountain Bike	Nordic Ski	Trail Bike
ATV	Four-Wheel Drive (4x4)	Snowmobile	Barrier-Free	

On trail signs and in other graphic representations, the user type would be indicated through use of the appropriate, existing international symbol. Examples of these symbols are shown in Figure 2.



HIKER | PACK & SADDLE | BICYCLE/ MT. BIKE | BARRIER FREE

Figure 2. Examples of international symbols for trail users.

Part 2: Accessibility level identification

The Design Guide for Accessible Outdoor Recreation identifies four levels of accessibility associated with four condensed ROS classes (Frayer and Meade, 1992). See Figure 3.

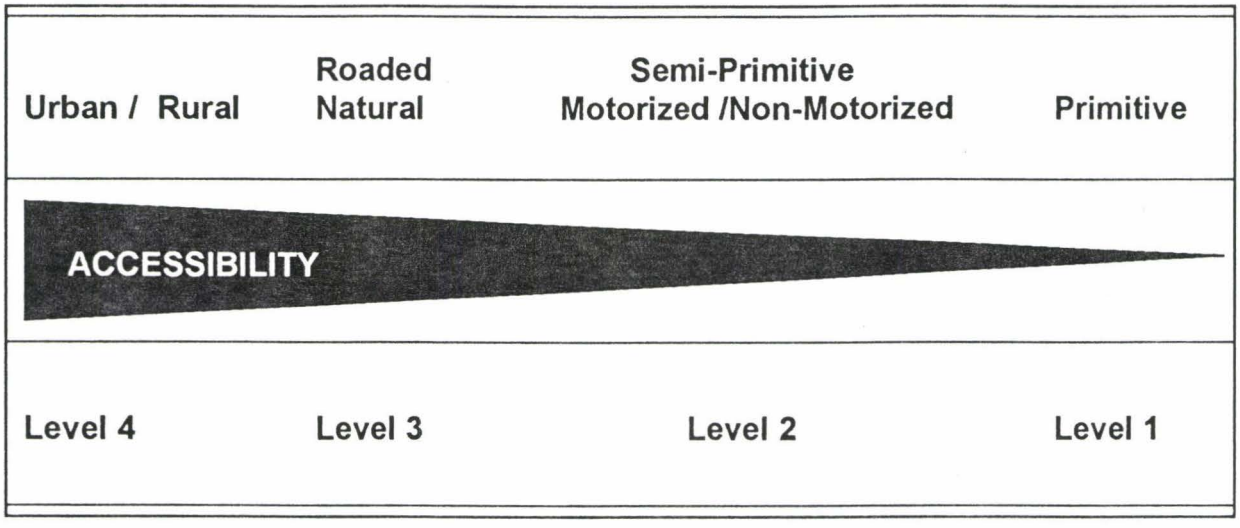


Figure 3. Accessibility Expectations.

The accessibility level, provides the needed tie to ROS and is the second element of the difficulty rating. However, in order to make the levels consistent with other systems of quality rating, where the most accessible rating is "1", the numerical order is reversed (Figure 4).

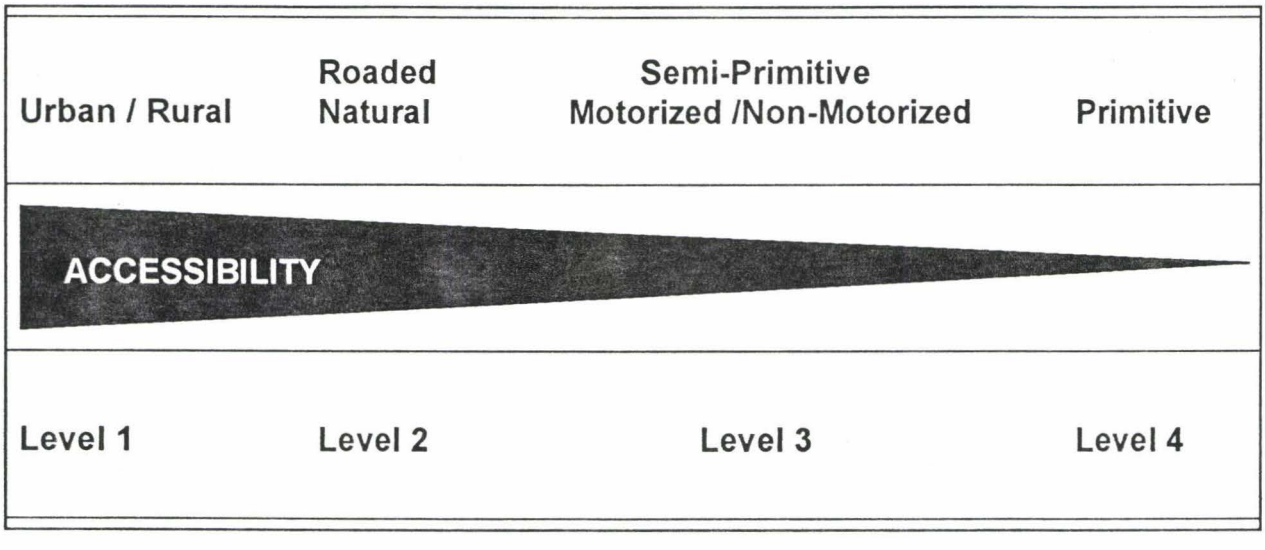


Figure 4. Revised accessibility level numbering.

Thus, this element of the rating, from 1 for the most accessible through 4 for the least accessible, is consistent with rating systems such as the National Climbing

Classification System, the European Rapid Rating System, and other rating systems in which difficulty increases and accessibility decreases as the rating number increases. This part of the nomenclature corresponds to the ROS objectives and accessibility standards for the lands on which the trail is located.

Part 3: Difficulty identification

The third element of the rating is the difficulty of each trail according to user-type and the established standards for difficulty in the Handbook. In order to conform to a number/letter scheme, the three classes, Easiest, More Difficult, and Most Difficult, are assigned the letters A, B, and C, in descending order of accessibility for consistency with the use of the Accessibility Levels and other rating systems. A number/letter scheme incorporating both accessibility objectives and difficulty is needed for internal documentation, monitoring, planning and record keeping.

Where the trail falls on lands with different ROS classes, or the difficulty changes dramatically, one of two options is recommended. The trail could be rated corresponding to the least accessible ROS class or most difficult level. Or, the trail could be broken into segments where it is convenient and logical to do so. Each segment is then classified according to the appropriate accessibility level and difficulty level.

Summary of the recommended difficulty rating system

Therefore, for each user type, a set of trail difficulty ratings exists that ranges from "1A" through "4C". This range represents accessibility levels from 1 through 4 for Urban/Rural through Primitive, and difficulty ratings from "A" through "C" corresponding to existing standards for Easiest, More Difficult, and Most Difficult.

The existing symbols for Easiest, More Difficult, and Most Difficult have been in use for some time and are widely recognized (Figure 5). Therefore, it is recommended that those symbols be incorporated in signs or graphics for each new rating. For example, the symbol for "Easiest" trails would appear with all "A" ratings, and so on.

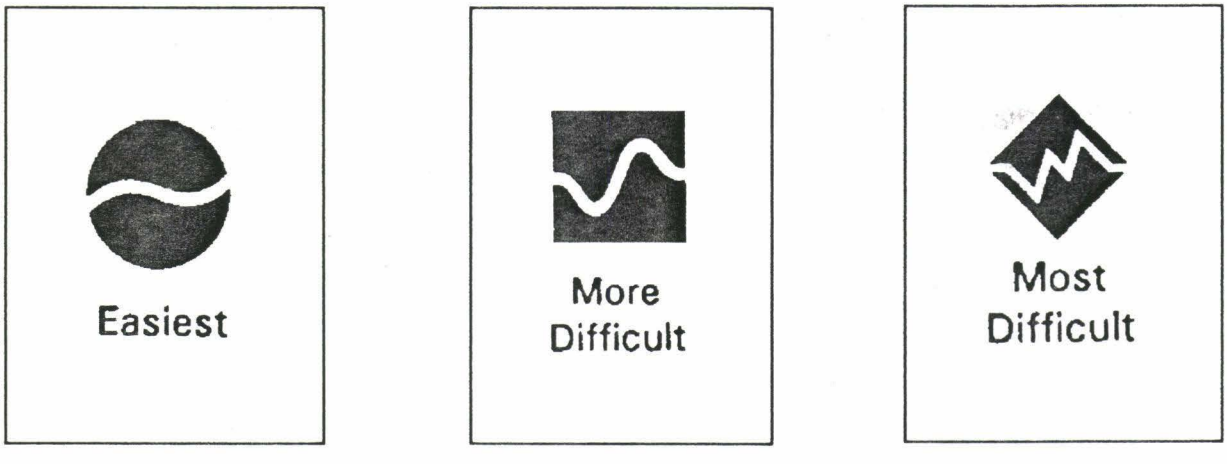


Figure 5. Symbols for difficulty ratings A, B, and C.

An example of a sign displaying all elements of the difficulty rating system is shown in Figure 6.

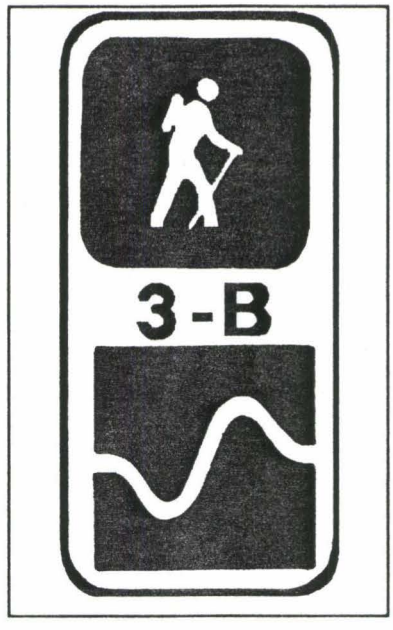


Figure 6. Typical trail difficulty sign, as proposed, for a More Difficult hiker trail in the Semi-Primitive ROS class.

There is, however, a risk that some hikers may interpret the "easiest" symbol appearing on a trailhead in a Primitive area to mean the same thing as the same symbol appearing on a trailhead in an Urban/Rural area. It is still important that the user understand the accessibility standards for each ROS class. Special educational materials and activities are required to assist in this goal. As discussed before, the "easiest" or level "A" trail for hikers has the greatest potential for misunderstanding because it may occur in all the ROS classes and encompasses a very wide range of conditions, including the full range of barrier-free trail conditions. Despite that, the risk of the user having problems is minimal. It is still an easy trail, and those with disabilities would look for the barrier-free symbol before using it.

Another factor tending to minimize the risk of incorrect expectations is the environment in which they occur. A reasonable person encountering a level "1A" trail in an urban area where barrier-free use is also provided would not expect that trail to push the limits of difficulty which might commonly occur on a "4A" trail leading to a Wilderness.

Accessibility norms

The next task is to define where these different levels of access and trail difficulty are appropriate. Frayer and Meade identified anticipated "Accessibility Norms" for each class (see Table 3).

Table 3. Accessibility Norms (Frayer and Meade, 1992).

LEVEL	URBAN / RURAL	ROADED NATURAL	SEMI-PRIMITIVE MOTORIZED & NON- MOTORIZED	PRIMITIVE
1	**NORM**	Possibility	N/A	N/A
2	Possibility	**NORM**	Inconsistent	N/A
3	Possibility	Possibility	**NORM**	Possibility
4	Inconsistent	Possibility	Possibility	**NORM**

Note that accessibility levels are reversed to conform to the earlier change in numbering scheme.

Standards for experience, modifications, and accessibility associated with these levels have also been defined. These standards are reproduced in Table 4. Again, numbering has been reversed to be consistent with the proposed decline in accessibility from Level 1 through Level 4.

Table 4. Standards for Experience, Modifications, and Accessibility. (Frayer and Meade, 1992).

The Four ROS Levels of Accessibility

Level 1: Easy Access ROS -- Urban/Rural Areas	Level 2: Moderate Access ROS -- Roaded Natural Areas
Experience: Opportunity to affiliate with all users, both able-bodied and disabled is high. Fully accessible facilities offer feelings of dignity, comfort, security, and convenience.	**Experience:** Opportunities to affiliate with others and escape from the sights and sounds of human activity are about equal. User structures are fully accessible. A moderate level of difficulty may be experienced on pathways and trails offering limited feelings of challenge, comfort and convenience.
Modifications: Structures and complexes are highly developed and dominant. They often occur as nodes in other settings, i.e. resorts, marinas, and ski areas. Large numbers of people frequent the site and the controls over these visitors are obvious and numerous.	**Modifications:** Structures are scattered, rustic in appearance and offer only moderate levels of comfort. The natural setting is dominant. There are fewer people and contact between them is moderate to high on roads and highways; low to moderate on trails. On site regimentation is noticeable but in concert with the natural setting.
Accessibility: All programs, services, and facilities provided are fully accessible. Recreation settings designated as Level 1 are intended for independent use by people with disabilities. Level 1 requires access by a continuous and integrated path of travel to and between all support facilities: parking, visitor centers, exhibits, camping, picnicking, trails, water activities, restrooms, etc. All Facilities and sites are in full compliance with ADAAG provisions.	**Accessibility:** Programs, services, and facilities provided in settings designated as Level 2 present a lower level of accessibility than Level 1 and therefore present a greater challenge for some persons with disabilities. Level 2 recreation settings are still accessible by a continuous path of travel, but surface materials may exhibit a rougher texture, and linear slopes should not exceed 8.33%. All rest areas, toilets, etc. are still in full compliance with ADAAG provisions, but they may be farther apart.

Level 3: Difficult Access ROS -- Semi-Primitive Areas

Experience: High to moderate probability of experiencing isolation from the sites and sounds of humans, independence, closeness to nature, tranquility and self-reliance through the application of outdoor skills. In an environment that offers challenge and risk. Opportunity to have a high degree of interaction with the natural environment. Limited opportunity to use motorized equipment in Semi-Primitive Motorized.

Modifications: Structures of any kind are rare and isolated. User structures when available are fully accessible but rustic, rudimentary and offer very low levels of comfort. The natural setting has only occasional alterations that are very subtle. There are few people and contact between them is low to moderate. On site controls are limited and subtle.

Accessibility: Programs, services, and facilities provided in settings designated as Level 3 present a lower level of accessibility than either Level 2 or Level 1, and therefore present an even greater challenge for all people. Level 3 recreation settings may not be accessible by a continuous path of travel, surface materials may be natural, and linear slopes may be determined by the environment: trails and paths, if provided however, should not exceed 12% slope, and should be free of obstacles and barriers such as fallen trees, stumps and etc.. Given this ROS category, development or modification of the environment may be limited, however any structural facilities provided are still in full compliance with ADAAG provisions.

Level 4: Most Difficult Access ROS -- Primitive Areas

Experience: Extremely high probability of experiencing isolation from the sights and sounds of humans, independence, closeness to nature, tranquility and self-reliance through the application of outdoor skills in an environment that offers the greatest amount of challenge and risk.

Modifications: Wilderness or otherwise unmodified natural environment. Structures are extremely rare. There are very few people and contact between them is quite low. Controls on the visitor are primarily from off site.

Accessibility: Level 4 presents the lowest level of accessibility, and therefore presents the greatest challenge to people irrespective of ability. Given this level's ROS designation and probable location in wilderness areas, amenities of any kind are generally not provided. Level 4 recreation settings may be inaccessible for many persons with disabilities via their normal means of locomotion: horseback, piggyback, canoe or other means.

These charts show the level of accessibility and experience recommended or proposed for each of the four condensed ROS classes.

However, with those expectations, they provide that "individual recreation sites may present a spectrum of accessibility. Roaded Natural settings, for example, are expected to exhibit Level 3 Moderate Access but may contain specific sites wherein accessibility naturally approaches the Urban/Rural or Semi-Primitive settings". In this context, the word "site" is synonymous with facility, and is interpreted to include trails.

Considerations for availability of more challenging experiences in Urban/Rural areas

Access versus experience

Trails which are meant for use with specialized equipment, such as ATV's, may restrict use by the disabled due to the nature of the use and the experience being provided. Trails are a kind of facility that must be considered according to their intended experience. A motorcycle trail, or a constructed climbing face for mountaineering practice, cannot provide the intended experience if it must be accessible for all. Where the disabled seek those experiences, they often take advantage of specialized equipment, such as specially modified motorcycles, ATV's, four-wheel drive vehicles, or horses with special saddles. Many of these uses may require a partner who assists the person in mounting the vehicle or horse. Occasionally, they may be limited to the easier trails for that type of trail and use. Seldom will one find a specialized trail, particularly for motorized uses, that has been so modified as to minimize or eliminate the barriers, the challenge, and the experience the user seeks, whether the user is able-bodied or disabled.

A good example of this difference between access and experience is the relatively new phenomenon of constructed practice mountaineering walls built in urban shopping malls of some larger cities. This would seem to be the ultimate conflict in accessibility. However, Urban/Rural access, as provided by the Act and recommended by Meade (Meade, 1992), means that the disabled must be able to reach and utilize the facility. Doors, aisles, service levels, shops, restroom facilities, etc. must be totally accessible, including access for the disabled to the base of the climbing wall. Beyond that, the facility (the wall) and the experience of conquering it are available only to those who have the ability.

What a shame it would be for a disabled climber to be unable to reach such an opportunity because the building was not barrier-free to a person in a wheelchair or a person with sight impairments. Such a "primitive" opportunity is also a real attraction to many climbers, despite its occurrence in a highly developed, urban environment.

The accessibility expectations for the Urban/Rural and Roaded Natural ROS classes would eliminate many experiences if we did not accept trails and trail conditions that are inaccessible to the disabled. Therefore, there exists a group of trails and trail

users that may be logically excluded from the requirements for barrier-free accessibility because meeting a barrier-free standard eliminates the experience for all.

These are the trails and users that utilize a specialized means of transportation that provides a major portion of the experience rather than simply a means of access to an area.

Deferring consideration of the winter uses, five of the seven categories described in the Handbook are specialized uses in which the user seeks a trail experience that is dependent on motorized, mechanized, or horse transportation. These include trail bike, ATV, mountain bike, 4x4, and pack and saddle. While Frayer and Meade indicated that "most difficult" accessibility conditions may not be appropriate for the Urban/Rural ROS class (Frayer and Meade, 1992), and the "easiest" accessibility conditions are generally not appropriate in the Primitive ROS class, there is a demand for a wide range of experiences within lands managed for each ROS class (Virden and Schreyer, 1988). Therefore, it is important to provide the broadest possible range of experiences for these specialized activities where it is legal and possible to do so.

Because of the experience objectives for the Primitive ROS class, accommodation for mechanical modes of transportation, such as mountain bikes, should be limited to the Most Difficult level and should provide experiences that are not available elsewhere. Opportunities for primitive motorized recreation should be confined to the Semi-Primitive Motorized class and excluded from the Primitive class. The nature of the motorized experience, its impacts on natural resources and other visitors, and the type of trails necessary to support motorized vehicles are inconsistent with the objectives for recreation experiences in the Primitive ROS class. In most cases, the "primitive" experiences desired by motorized recreationists can be met in areas classed as Semi-Primitive Motorized.

As discussed earlier, the provision of more difficult trails for these specialized uses in Urban/Rural or Roaded Natural areas does not exclude an experience from the disabled. It may, in fact, provide an experience that the disabled person can enjoy much more conveniently, closer to home or with less cost involved, through their adaptation of equipment.

Trail difficulty distribution among ROS classes for hikers and people with disabilities

For the remaining two user classes, barrier-free and hikers, the trail provides elements of both access and experience. These two uses depend on one's physical ability for the intended experience and to provide access to other facilities. Here, access to facilities and providing trail experiences that are expected for the ROS class makes our requirements for trail conditions more critical. Therefore, it is necessary to define what kinds of trails are possible and what kind of trails are appropriate for hikers and barrier-free use in the different ROS classes.

For these two users, the full range of trail difficulty may not be present or may be

disproportionately represented in some ROS classes, according to the accepted standard for the range of accessibility in that ROS class. More difficult trails may not be present or numerous in the highly developed ROS classes due to lack of opportunity. Similarly, less challenging or barrier-free trails may not be present or numerous in less developed areas due to difficult terrain, the cost of construction, or management direction such as that for Wilderness.

As we apply the existing standards for trail difficulty rating to the Urban/Rural ROS class, including barrier-free trails, the range of trail conditions for Hiker trails rated as "A" increases dramatically over that for which the "Easiest" trail designation was developed. Our current concept of "Easiest" generally involves trails in the Semi-primitive or Primitive ROS classes. As currently applied, the difficulty standards are written as limits. For example, the "Easiest" hiker trail includes maximum slope pitches of up to 20%. However, the new system includes a whole range of trails, typically located in the Urban/Rural or Roaded Natural ROS classes, that may be nearly flat because of terrain or accommodation for barrier-free use. This is not a conflict because of the way the standards are written. However, the user and the trail manager should understand that the typical "Hiker--1A" trail may be significantly different from the typical "Hiker--4A" trail. Because of this, it is important to understand and consider the implications of the accessibility element of the rating which is determined by the ROS class of the area in which the trail occurs.

Although it would be desirable to avoid the apparent confusion of differences in expectations between ROS classes, the situation is most apparent in the Urban/Rural ROS class and with the "A" or easiest difficulty level. As difficulty approaches the conditions in "C" (for all users except barrier-free), those trail conditions occur more typically in the Semi-primitive or Primitive ROS classes and the range of conditions described as "C", or Most Difficult, is narrower.

Revised difficulty standards

Figure 4 and Tables 3 and 4 display early recommendations for accessibility associated with each of the four condensed ROS classes. These recommendations are for sites or facilities in which access is required to bring one into contact with amenities, interpretation, information, or experiences. Accessibility standards were never intended to apply directly to trails (Meade, 1992). As discussed earlier, for some trails, the use of the trail is all or a significant portion of the experience. Therefore, the trail cannot be significantly modified without altering or eliminating the experience.

Because of this, the concept that all trails in the Urban/Rural ROS class, for example, must have difficulty ratings which conform to Level 1 accessibility standards eliminates a wide range of experiences, not only from the able-bodied but from the disabled as well. Therefore, where the trail is the experience, deviation from those standards should be allowed. Where the function of the trail is primarily to provide access to experiences, the difficulty levels should conform to accessibility standards.

Figure 7 below displays a proposed conceptual distribution of trail difficulty levels by user type and ROS class, excluding winter uses. This distribution illustrates the interrelationship of ROS class, accessibility level, and trail difficulty. The distributions also take into account that a higher proportion of urban/rural trails provide access to other facilities than do trails in Semi-primitive or Primitive areas.

Because local distribution of trail conditions is dependent on terrain, trail opportunities, and the nature of local demand for trail experiences, this cannot be offered as a standard for distribution for any management unit. However, it can be used to guide planning for new trails where alternatives exist, or to review an entire trail system to determine if a sufficiently wide range of experiences is being provided, particularly for people with disabilities or others who prefer a more accessible, less difficult trail experience. The actual distribution of trail difficulty should be adapted to local conditions and demands, taking advantage of every opportunity to provide for disabled access to the full range of experiences.

Figure 7 on following page.

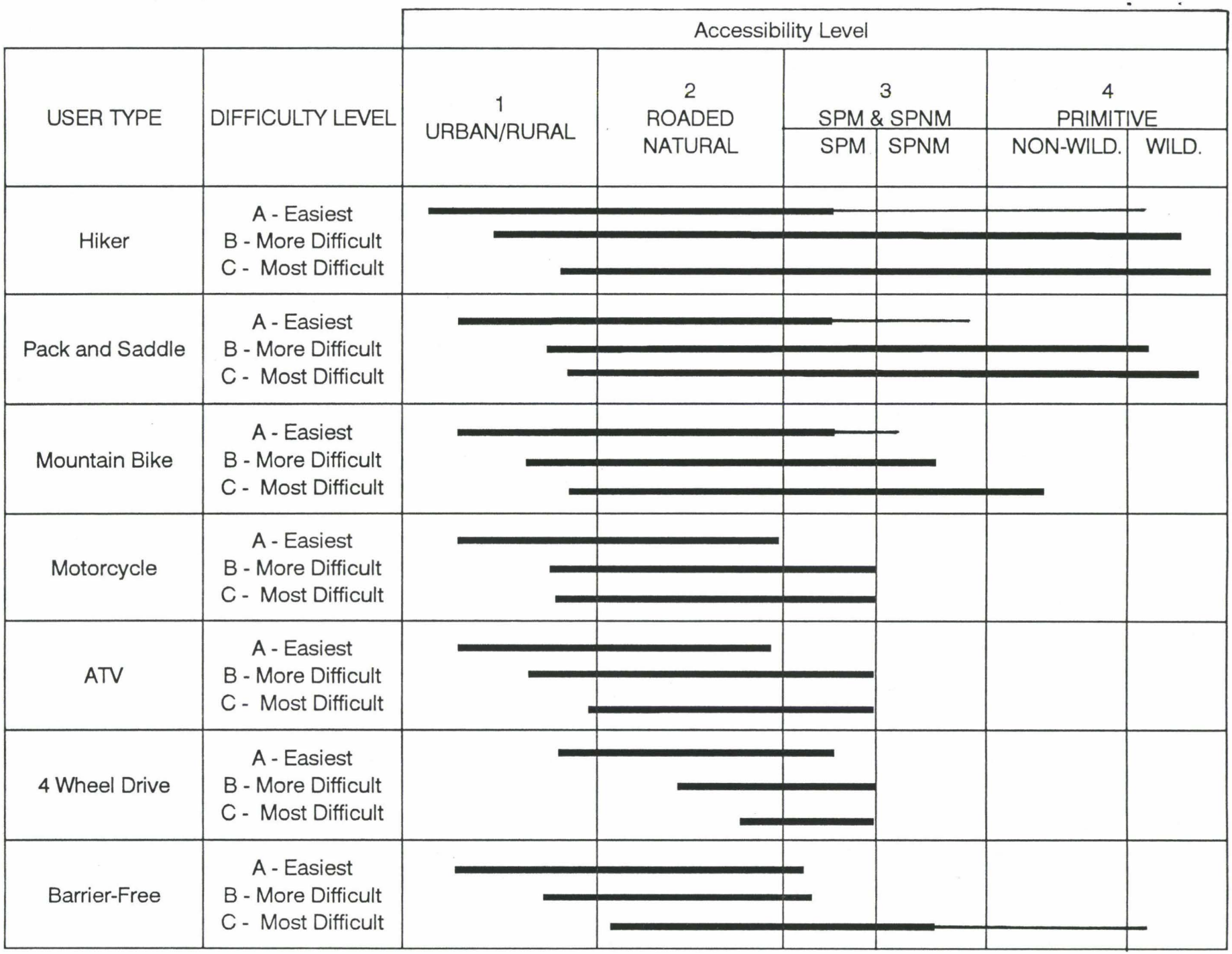


Figure 7. A conceptual distribution of trail difficulty levels among ROS classes.

In interpreting Figure 7, it is important to note the relative absence of Difficulty Level 1 (Easiest) trails as well as the total absence of motorized use in the Primitive class. The mechanized, mountain bike use is recommended at the Most Difficult level in Primitive, Non-Wilderness areas because the experience is in demand and may not be available in the other classes.

The thinner lines occurring in the SPM, SPNM, and Primitive classes signify that the indicated level of difficulty for that use is marginal or limited within that ROS class. In general, highly developed and maintained trails necessary to meet Level 1 access standards, and all Barrier-free levels, are not consistent with Semi-Primitive and Primitive experience objectives. Accessibility objectives may be met, but at greater levels of difficulty. For people with disabilities, accessibility in the Semi-Primitive classes may be available, but not without great personal effort and, in many cases, physical assistance.

DISCUSSION and SUMMARY

The recommended system and symbols meet the established objectives. For any given trail, it identifies what type(s) of use(s) are managed for through display of the international symbol for that use. It defines the accessibility level and related objectives associated with the ROS class in which the trail is located. Finally, it identifies the level of difficulty for each user based on trail condition parameters established by the users.

For recreation managers, the key is understanding the accessibility objectives for each ROS class and how different levels of difficulty contribute to meeting those overall objectives. This is also important for the user. The goal of making available the broadest range of conditions and experiences to the broadest possible audience is best served by providing the widest range of difficulty levels possible in each ROS class.

Each ROS class carries with it certain standards for accessibility and experience. The trails within that ROS class should provide a high percentage of conditions which are compatible with those accessibility and experience objectives. A smaller percentage of those trails, providing experiences outside the expected normal range of conditions, can add the "spice" to the system, providing unusual challenges and accomplishments, and a more attractive mix of experiences.

The "Easiest" or "A" difficulty class for hikers is effectively enlarged by the addition of the full range of barrier-free trails and other more highly developed urban/rural trails. While an understanding of the accessibility objectives for the ROS class in which these trails occur will resolve most confusion, there is another alternative that may warrant further investigation. The National Climbing Classification System (Beckey, 1979) provides a decimal addition to Class 5 which breaks down different levels of climbing difficulty within a larger class requiring climbing protection. This decimal system may have application to the A-class difficulty in differentiating between significant variations among the easiest trails, such as the presence of surfacing, barrier-free slopes, etc. This modification of the recommended system would require further detailed analysis to ensure consistency.

A second alternative also exists, requiring simplification of the ROS system, including reducing the number of classes to three. This alternative is based primarily on access and is made up of three classes: 1) those areas one may drive to on roads, 2) those areas one can drive or ride to by trail, and 3) those areas one must hike to. This alternative obviously ties experiences directly to accessibility. While this may simplify communications and objectives, it may not provide for or support management for a full range of experiences. Additional research would have to be done to support a case for "lumping" or splitting" existing ROS classes.

This rating system and symbology may be applied to the full range of existing signing standards. One concern with those standards is that the National Forest-standard "Degree of Difficulty" sign, either a plywood 18"x24" sign or a routed oak 6"x6"

sign, shows only the difficulty rating and does not incorporate the user symbol. When one considers the costs of purchase, installation, and maintenance, it may be more cost effective, and potentially more aesthetically pleasing, to combine the user symbol and the difficulty rating in one sign, such as displayed in Figure 6. There are many factors to be considered in this issue and it is beyond the scope of this paper to deal comprehensively with those factors.

The recommendations for distribution of difficulty levels among the ROS classes consider both the objectives of ROS and current direction for accessibility. These recommendations provide the opportunity for a broader range of trail experiences in each ROS class than is suggested in either the "ROS Primer and Field Guide" or the "Design Guide for Accessible Outdoor Recreation" (Draft). They exceed the recommendations of the ROS Primer by providing for a slightly broader range of accessibility in the more primitive ROS classes. On the other end of the spectrum, they recommend more difficult trails and trail experiences in the Urban/Rural and Roaded Natural ROS classes. The greatest effect of these recommendations is to broaden the application of Most Difficult trails.

It is important to note that these "divergences" are not contrary to the current thinking of those who are most directly associated with ROS or implementing the Americans with Disabilities Act in National Forest recreation opportunities. However, there are disagreements as to the importance of the diluting effect of a broader range of experiences being available within individual ROS classes. The author feels that, by emphasizing a "norm" for experiences in each ROS class while minimizing the range of unacceptable experiences or conditions, it is possible to provide the broadest possible range of trail experiences to all users.

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